

**CLAIMS**

We claim:

1. A protection structure comprising:  
open cell core structure;  
a top face sheet coupled to said core structure;  
a bottom face sheet coupled to said core structure distal from said top face sheet;  
a projectile arresting layer coupled to said top face sheet distal from said core structure; and  
a fragment catching layer couple to said bottom face sheet distal from said core.
2. A protection structure comprising:  
open cell core structure;  
a top face sheet coupled to said core structure;  
a bottom face sheet coupled to said core structure distal from said top face sheet;  
a projectile arresting structure disposed inside said core structure; and  
a fragment catching layer couple to said bottom face sheet distal from said core.
3. A protection structure comprising:  
open cell core structure;  
a top face sheet coupled to said core structure;  
a bottom face sheet coupled to said core structure distal from said top face sheet;  
a projectile arresting layer coupled to said top face sheet distal from said core structure; and  
a fragment catching structure disposed inside said core.
4. The protection structure of claim 3, further comprising:  
a projectile arresting structure disposed in said core structure.

5. A protection structure comprising:  
open cell core structure;  
a top face sheet coupled to said core structure;  
a bottom face sheet coupled to said core structure distal from said top face sheet;  
a projectile arresting layer coupled to said top face sheet distal from said core structure; and  
a fragment catching structure disposed inside said core and a fragment catching layer couple to said bottom face sheet distal from said core.

6. The protection structure of claim 5 further comprising:  
a projectile arresting structure disposed inside said core structure.

7. A protection structure comprising:  
open cell core structure;  
a top face sheet coupled to said core structure;  
a bottom face sheet coupled to said core structure distal from said top face sheet;  
a projectile arresting structure disposed inside said core structure; and  
a fragment catching structure disposed inside said core.

8. The structure of any one of claims 1-7, wherein said core comprises:  
at least one truss layer comprised of at least one truss unit.

9. The structure of claim 7, wherein at least one of said truss units have units having a geometrical shape of at least one of: tetrahedral, pyramidal, Kagome, bilayer, trilayer, cone, frustum, or combinations thereof and other non-limiting arrangements.

10. The structure of claim 7, wherein at least one of said truss units have

leg members.

11. The structure of claim 10, wherein at least one of said leg members is hollow or solid or combination thereof.

12. The structure of any one of claims 1-7, wherein said core comprises: at least one textile layers, said textile layer comprised of at least one array of intersecting structural support members forming apertures of predetermined geometric configurations.

13. The structure of claim 12, wherein said structural support members are at least one of tubular filaments or wire filaments, or combination thereof.

14. The structure of claim 12, wherein said structural support members are made from at least one of woven material, woven mesh, square woven mesh, rectangular woven mesh, multisided woven mesh, knitted mesh, braided mesh, triaxial mesh, biaxial mesh, or quasi-triaxial mesh, or combination thereof.

15. The structure of any one of claims 1-7, wherein said core comprises: at least one open cell foam comprised of at least one of hollow ligaments or solid ligaments or combination thereof.

16. The structure of any one of claims 1, 3, or 5 wherein said projectile arresting layer comprise at least one of tiles, ceramic tiles, applied layers, fiber reinforced, particular reinforced, rods, spheres, chemically hardening slurries, cubes and/or other geometric shapes self contained.

17. The structure of any one of claims 1, 3, or 5 wherein at least one of said projectile arresting layer is at least one material comprised of ceramic or partial composites of ceramic or combination thereof.

18. The structure of any one of claims 1, 2, or 5 wherein said fragment catching layer comprise at least one of fabric, Kevlar fabric, Spectra fabric, S2 glass fabric, and/or Zylon fabric, tape, Kevlar tape, Spectra tape, S2 glass tape, and/or Zylon tape.

19. The structure of any one of claims 1, 2, or 5, wherein said fragment catching layer comprise at least one of fabric, Kevlar fabric, Spectra fabric, S2 glass fabric, and/or Zylon fabric, wherein any of said fabrics are infiltrated with a hardening resin.

20. The structure of any one of claims 1, 2, or 5 wherein at least one of said fragment catching layer is at least one material comprised of Kevlar, partial composites of Kevlar, Spectra, partial composites of Spectra, S2 glass, partial composites of S2 glass, Zylon, and/or partial composites of Zylon or combination thereof.

21. The structure of any one of claims 2, 4, 6, or 7 wherein said projectile arresting structure comprise at least one of tape, ceramic tape, coating, fiber reinforced, particular reinforced, ceramic coating, powder, ceramic powder, partial composite of ceramic powder, ceramic fabric, and/or partial composite of ceramic fabric.

22. The structure of any one of claims 2, 4, 6, or 7 wherein at least one of said projectile arresting structure is at least one material comprised of ceramic or partial composites of ceramic and/or combination thereof.

23. The structure of any one of claims 3, 4, 5, 6, or 7 wherein said fragment catching structure comprise at least one of fabric, Kevlar fabric, tape, Kevlar tape, coating, Kevlar coating, powder, Kevlar powder, fabric, Kevlar fabric, Spectra fabric, S2 glass fabric, and/or Zylon fabric, or combination thereof.

24. The structure of any one of claims 3, 4, 5, 6, or 7 wherein said

fragment catching structure comprise at least one of fabric, Kevlar fabric, tape, Kevlar tape, wherein any of said fabrics and/or tape are infiltrated with a hardening resin.

25. The structure of any one of claims 3, 4, 5, 6, or 7 wherein at least one of said fragment catching structure is at least one material comprised of Kevlar or partial composites of Kevlar, Spectra, partial composites of Spectra, S2 glass, partial composites of S2 glass, Zylon, partial composites of Zylon, and/or combination thereof.

26. A method of making a protection structure comprising:  
providing an open cell core structure;  
coupling a top face sheet to said core structure;  
coupling a bottom face sheet to said core structure distal from said top face sheet;  
coupling a projectile arresting layer to said top face sheet distal from said core structure; and  
coupling a fragment catching layer to said bottom face sheet distal from said core.

27. A method of making a protection structure comprising:  
providing an open cell core structure;  
coupling a top face sheet to said core structure;  
coupling a bottom face sheet to said core structure distal from said top face sheet;  
disposing a projectile arresting structure inside said core structure; and  
coupling a fragment catching layer to said bottom face sheet distal from said core.

28. A method of making a protection structure comprising:  
providing an open cell core structure;  
coupling a top face sheet to said core structure;  
coupling a bottom face sheet to said core structure distal from said top face sheet;

coupling a projectile arresting layer to said top face sheet distal from said core structure; and

disposing a fragment catching structure inside said core.

29. The method of claim 33, further comprising:

disposing a projectile arresting structure in said core structure.

30. A method of making a protection structure comprising:

providing an open cell core structure;

coupling a top face sheet to said core structure;

coupling a bottom face sheet to said core structure distal from said top face sheet;

coupling a projectile arresting layer to said top face sheet distal from said core structure; and

disposing a fragment catching structure inside said core and a fragment catching layer couple to said bottom face sheet distal from said core.

31. The method of claim 34 further comprising:

disposing a projectile arresting structure inside said core structure.

32. The method of making protection structure comprising:

providing an open cell core structure;

coupling a top face sheet to said core structure;

coupling a bottom face sheet to said core structure distal from said top face sheet;

disposing a projectile arresting structure inside said core structure; and

disposing a fragment catching structure inside said core.